
New Taxa from the A'nyêmaqên Shan Region of Eastern Qinghai Province, China

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ABSTRACT. Five new species and two varieties from Qinghai Province, China, are described, discussed, and compared with their closest presumed relatives. *Cremanthodium microglossum* (Asteraceae), *Oxytropis qinghaiensis* (Fabaceae), *Comastoma jigzhiense* (Gentianaceae), *Gentiana clarkei* var. *lutescens* (Gentianaceae), *Parnassia qinghaiensis* (Saxifragaceae), *Pedicularis armata* var. *trima-culata* (Scrophulariaceae), and *Peristylus humidicolus* (Orchidaceae). Two of the species are illustrated.

From late July through August 1993, the authors explored the A'nyêmaqên mountain range of eastern Qinghai Province, China. This region is situated between latitude 32°32'–35°31'N and longitude 99°30'–101°30'E. The average altitude of the region is over 4000 m. The highest peak, Maqên Gangri, reaches 6282 m. The climate is cold, moist, and windy, and the vegetation is characterized by alpine species of genera such as *Astragalus*, *Carex*, *Cremanthodium*, *Gentiana*, *Kobresia*, *Oxytropis*, *Pedicularis*, *Saussurea*, and *Saxifraga*. The common woody plants in this area are low *Potentilla* and *Salix* shrubs, which are found at all but the highest elevations. At lower elevations there are scattered *Juniperus przewalskii* Maximowicz, although most of our collections were made above timberline. During the one month of fieldwork 1554 numbers and about 11,800 specimens were collected. The main sets of specimens so far have been distributed to A, BM, CAS, E, HNWP, and MO. Further sets remain to be distributed from HNWP. During routine determinations of all collections from this region we discovered the following five

new species and two new varieties, which are additions to the published volumes of *Flora Reipublicae Popularis Sinicae* (Ho, 1988; Liu, 1989; Tsoong, 1968). Names of contributors are fully spelled in the acknowledgment section.

ASTERACEAE

Cremanthodium microglossum S. W. Liu, sp. nov. TYPE: China. Qinghai: Madoi Xian, Qingshui Xiang, Huoluoguoqai, between Darlag and Huashixia, 34°49'22"N, 99°02'34"E, elev. 4600–4730 m, 17 Aug. 1993, *T. N. Ho, B. Bartholomew & M. Gilbert 1372* (holotype, HNWP; isotype, CAS). Figure 1.

Haec species *Cremanthodium nano* (Decaisne) W. W. Smith similis, sed ab eo calathio discoideo, corolla flosculi foeminei graciliter tubulosa limbo truncato vel ligula lineari praedito ac bracteis involueralibus ad medium rectangulo-patulis recedit.

Perennial herbs 4–15 cm tall. Roots 4–20, stout, 1.5–3 mm diam., fleshy. Stem solitary, dark purple, glabrous below, white and black villous above (especially near capitulum). Radicle leaves with purple-brown glabrous petioles, 4–14 cm; leaf blade ovate to broadly ovate, 1–3 × 0.7–2.4 cm, both surfaces white and black villous, base rounded to truncate, margin entire, veins 3–5 and abaxially prominent. Stem leaves shortly petiolate or sessile; leaf blade ovate to oblong-ovate, 1.5–4 × 1–2 cm, both surfaces or only abaxially white and black villous, base ± amplexicaul, apex obtuse. Capitulum solitary, erect; involucre hemispherical, 1.5–2 × 2.5–3 cm; involueral bracts 9–12, in one row, oblong to narrowly lanceolate, 3–7 mm, rectangular-

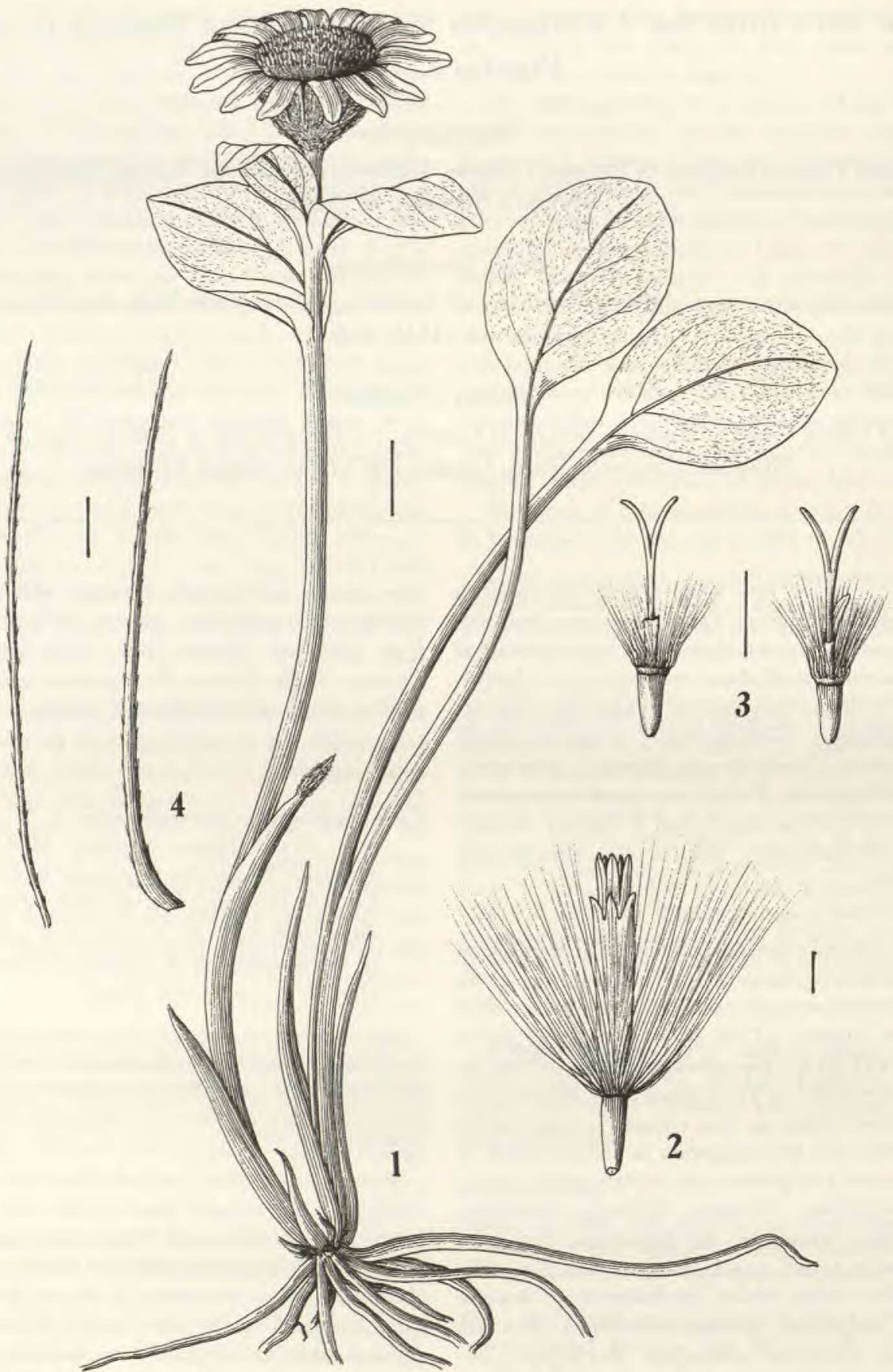


Figure 1. *Cremanthodium microglossum* S. W. Liu. —1. Plant. —2. Disk floret. —3. Ray floret. —4. Pappus. Scales: 1 = 1 cm; 2-4 = 1 mm. (Drawn by Ling Ru-lian.)

spreading from middle, abaxially densely white and black villous, margin entire, apex obtuse to acute. Radial florets female, white; corolla narrowly tubular, 3–6 mm, slender, limb truncate or with poorly linear ligules; style 6.5–11 mm, 2- or 3-branched. Disk florets hermaphroditic, orange, \pm as high as involucre; corolla tubular, limb 5-lobed. Achenes cylindrical, 4–5 mm, striate; pappus white, 1–1.2 cm, in 2 series, scabrous.

Cremanthodium microglossum is allied to *C. nanun* (Decaisne) W. W. Smith but is easily distinguished by having involucre bracts rectangular-spreading from the middle, capitulum nearly discoid, corollas of the radial female florets slender, narrowly tubular, and limbs truncate or sometimes with poorly linear ligules.

Habitat. Grassy slopes in alpine periglacial zone, alpine meadows, and swamp meadows. Altitude from 4000 to 5400 m.

Paratypes. CHINA. **Gansu:** Xigu, elev. 4100 m, 22 Sep. 1951, *T. P. Wang 14531* (PE). **Qinghai:** Qilian Xian, elev. 4000 m, 24 July 1962, *K. Ren & J. Y. Ding 2030* (HNWP); Nangqên Xian, elev. 5000 m, 21 July 1965, *Y. C. Young 1244* (HNWP); Qumarlêb Xian, elev. 5400 m, 28 June 1966, *R. F. Huang 37* (HNWP); Zhidoi Xian, elev. 4900 m, 13 Aug. 1966, *L. H. Chou 307* (HNWP); Henan Monggolzu Zizhixian, elev. 4200 m, 6 July 1967, *Y. C. Young 1663* (HNWP); Henan Monggolzu Zizhixian, elev. 4500 m, 6–19 July 1972, *P. C. Kuo 9960, 9877* (both HNWP); Chindu Xian, elev. 4500–4700 m, 19 July 1977, *S. W. Liu 2359* (HNWP); Chindu Xian, elev. 4600–4800 m, 11 Aug. 1977, *S. W. Liu 2484* (HNWP); Chindu Xian, elev. 5085 m, 2 July 1985, *W. Y. Wang 637* (HNWP). **Yunnan:** Dêqên Xian, elev. 4200 m, 30 July 1937, *T. T. Yü 9320* (KUN, PE).

FABACEAE

Oxytropis qinghaiensis Y. H. Wu, sp. nov. TYPE: China. Qinghai: Gadê Xian, Shanggongma Xiang, along the Danqu near its confluence with the Huang He, 33°50'33"N, 99°40'33"E, elev. 4020 m, 9 Aug. 1993, *T. N. Ho, B. Bartholomew & M. Gilbert 969* (holotype, HNWP; isotypes, A, BM, CAS, E, LE, MO, NY).

Haec species *Oxytropi kansuensi* Bunge et *O. melano-calyci* Bunge similis, sed ab ambabus planta dense albo-hispida cinerascens differt; a prima corolla purpurea vel azureo-purpurea ac legumine majore 12–16 × 5–7 mm, a secunda planta 15–40 cm alta ac foliis 6–14-jugis utrinque dense albo-hispidis differt.

Herbs, perennial, 15–40 cm tall. Stems tufted, densely white hispid, much branched from base. Stipules triangular-lanceolate, white hispid, connate below middle. Leaves imparipinnate, 5–12 cm; leaflets 6–14-jugate, mostly opposite or subopposite, sessile, ovate to ovate-lanceolate, 3–12 × 2–7

mm, both surfaces densely white hispid, base rounded, margin entire, apex acuminate to obtuse. Inflorescences terminal capitate racemes; peduncle 6–16 cm, white hispid below, black hispid above; bracts lanceolate, 4–7 mm long, hispid. Pedicel ca. 1 mm. Calyx 6–8 mm, densely black and white hispid, teeth less than or equal to tube length. Corolla purple to blue-purple, turning bluish with age; vexillum broadly obovate, ca. 1.2 cm, with a slightly concave tip; wing ca. 1 cm, with a complanate sac; keel ca. 9 mm, with a mucro less than 1 mm. Legumes oblong, 12–16 × 5–7 mm, densely white and black hispid, stipe ca. 2 mm, apex hooklike. Seeds 8–12.

Habitat. River terraces in alpine meadows. Elevation 3200–4400 m.

Paratypes. CHINA. **Qinghai:** Nangqên Xian, elev. 4100 m, 30 June 1965, *Y. C. Yang 1088* (HNWP); Yushu Xian, elev. 3550 m, 23 July 1980, *Z. D. Wei 2172* (HNWP); Gonghe Xian, elev. 3200 m, 12 July 1981, *R. F. Huang CG81–226* (HNWP); Tongde Xian, elev. 3100–3800 m, 27 July–19 Aug. 1990, *Y. H. Wu 5104, 6404, 6540, 6789, 6889, 6918, 7078* (all HNWP); Tongde Xian, elev. 3440 m, 10 Aug. 1990, *Y. H. Wu 6192* (HNWP); Henan Monggolzu Zizhixian, 30 Aug.–6 Sep. 1990, *Y. H. Wu 7450, 7526, 7575, 7583, 7623* (all HNWP); Menyuan Huizu Zizhixian, elev. 3200 m, 19 July 1991, *Y. H. Wu 7643* (HNWP); Maqên Xian, along the Qêm Qu, W of Maqên, 34°41'23"N, 99°40'03"E, elev. 3850 m, 27 July 1993, *T. N. Ho, B. Bartholomew & M. Gilbert 393* (BM, CAS, HNWP, MO); Maqên Xian, Dawu Xiang, along the Gequ He, N of Maqên on road to Jiangrang hydroelectric plant, 34°38'08"N, 100°14'37"E, elev. 3600 m, 31 July 1993, *T. N. Ho, B. Bartholomew & M. Gilbert 589* (A, BM, CAS, E, HNWP, MO); Darlag Xian, Jianshe Xiang, Nari, along the Dar Qu on S side of the Huang He, 33°41'38"N, 99°25'52"E, elev. 4050 m, 10 Aug. 1993, *T. N. Ho, B. Bartholomew & M. Gilbert 1088* (A, BM, CAS, HNWP, MO); Madoi Xian, Huashixia Xiang, along the Changma He, ca. 9 km S of Huashixia, 35°01'22"N, 98°51'38"E, elev. 4300–4400 m, 19 Aug. 1993, *T. N. Ho, B. Bartholomew & M. Gilbert 1505* (A, BM, CAS, HNWP, MO).

GENTIANACEAE

Comastoma jigzhiense T. N. Ho & J. Q. Liu, sp. nov. TYPE: China. Qinghai: Jigzhi Xian, elev. 4500 m, 1 Aug. 1971, *Golo Exped. 416* (holotype, HNWP).

Haec species *Comastomati falcato* (Turczaninow ex Karlin & Kirilov) Toyokuni similis, sed ab eo calyce lobis erectis ovatis vel ovato-lanceolatis, apice obtuso, corolla lobis tubo brevioribus orbiculatis vel late oblongis, apice rotundato differt.

Biennials 4–8 cm tall. Stem ascending, branched from base, lower internodes short. Leaves mostly basal; petiole to ca. 2 cm; leaf blade spatulate to obovate-spatulate, 4–12 × 2–5 mm, base narrowed, apex rounded to obtuse, midvein distinct. Flowers terminal, solitary; pedicel tinged purple, ascending,

4–6(–12) cm, often scapelike. Calyx 3–9 mm, $\frac{1}{3}$ – $\frac{1}{2}$ as long as corolla, tube shallowly 5-saccate at base; lobes unequal, ovate to ovate-lanceolate, apex obtuse, midvein distinct. Corolla blue, dark blue, or blue-purple, salverform, 10–20 \times 3–6 mm, apically 5-lobed; lobes 4.5–7.5 \times 2.5–3.5 mm, shorter than tube, orbicular to broadly oblong, base with 2 scales, apex rounded; scales fringed with nonvascular white fimbriae. Nectaries 10, at base of corolla tube. Stamens inserted at middle of corolla tube; filaments 5–6 mm, linear, base decurrent into wings of corolla tube; anthers blue, ellipsoid, ca. 1.5 mm. Style indistinct; stigma lobes nearly orbicular. Capsules narrowly ellipsoid, 1–1.5 cm. Seeds brown, nearly globose, ca. 0.7 mm diam.; seed coat smooth.

Comastoma jigzhiense is closely allied to *C. falcatum* (Turczaninow ex Karelin & Kirilov) Toyokuni but is distinguished by several characters, including calyx lobes that are erect and ovate to ovate-lanceolate and by corolla lobes that are shorter than the corolla tube and are orbicular to broadly oblong with a rounded apex.

Habitat. Alpine meadows on steep slopes, often dominated by *Kobresia* spp., often in open sites created by overgrazing and other disturbance. Elevation 4200–4600 m.

Paratypes. CHINA. **Qinghai:** Jigzhi Xian, elev. 4500 m, 25 July 1971, *Tibetan Medic. Exped.* 515 (HNWP); Jigzhi Xian, elev. 4200–4600 m, 9 Aug. 1971, *Tibetan Medic. Exped.* 591 (HNWP); Jigzhi Xian, elev. 4200–4600 m, 19 Aug. 1971, *Golo Exped.* 587 (HNWP); Maqên Xian, elev. 4500 m, 20 July 1976, *Maqên Exped.* 357 (HNWP); Maqên Xian, Xueshan Xiang, Caigongka, W of Maqên, 34°38'N, 99°44'E, elev. 4300–4600 m, 28 July 1993, *T. N. Ho, B. Bartholomew & M. Gilbert* 478 (CAS, HNWP); Maqên Xian, Dawu Xiang, Hetu Shan, at pass between Gyungo and Maqên, 34°28'09"N, 100°23'33"E, elev. 4220 m, 2 Aug. 1993, *T. N. Ho, B. Bartholomew & M. Gilbert* 652 (A, BM, CAS, HNWP, MO); Maqên Xian, Dawu Xiang, Heitu Shan, E of pass between Gyungo and Maqên, 34°27'38"N, 100°24'06"E, elev. 4300–4500 m, 2 Aug. 1993, *T. N. Ho, B. Bartholomew & M. Gilbert* 668 (BM, CAS, HNWP).

***Gentiana clarkei* Kusnezow var. *lutescens* T. N.**

Ho & J. Q. Liu, var. nov. TYPE: China. Qinghai: Madoi Xian, Heihai Xiang, Doucuo, between Wenquan and Huashixia, 35°21'21"N, 99°08'02"E, elev. 4190 m, 19 Aug. 1993, *T. N. Ho, B. Bartholomew & M. Gilbert* 1426 (holotype, HNWP; isotypes, BM, CAS, MO).

A *Gentiana clarkei* var. *clarkei* corolla lutescente, plicis triangulatis integris differt.

Plants of this variety are distinguished from *Gentiana clarkei* var. *clarkei* by the white corolla turning yellow-green with age and by triangular entire plicae. In variety *clarkei* the corolla is blue with obtuse ovate serrulate plicae.

Habitat. Flat steppe vegetation with scattered tussock grasses. Elevation ca. 4200 m.

SAXIFRAGACEAE

***Parnassia qinghaiensis* J. T. Pan, sp. nov. TYPE:** China. Qinghai: Yushu Xian, elev. 4250 m, 23 July 1964, *Yushu Exped.* 578 (holotype, HNWP).

Haec species *Parnassiae venustae* Jien affinis, sed ab ea bractea ad basin scapi inserta, nervis sepalorum sub apice confluentibus, staminodiis apice 3–5-dentatis, basi cum petalis et tubo calycino conjunctis, filamentis basi cum tubo calycino conjuncto, ovario semisupero differt.

Herbs, perennial, ca. 2 cm tall. Radical leaves 8 or 9; petiole 8–10 mm, widening at base into a membranous sheath, margin brown ciliate; leaf blade coriaceous, cordate-reniform, 4–6 \times 5–8 mm, glabrous, with brown dots, base cordate, apex obtuse. Scapes several, glabrous; bracteal leaf with petiole to 1 mm, margin brown ciliate; blade subcordate, 3.3 \times 3.5 mm, glabrous. Flower solitary. Calyx tube ca. 2 mm; lobes subovate, 3–3.3 \times 2–2.5 mm, with brown dots, both surfaces glabrous, apex obtuse, veins 5 or 6. Corolla pale yellow-green; lobes obovate, 4.3–5 \times 3–3.5 mm, base truncate to auriculate and with a claw connate to calyx tube and staminodes, margin erose, apex retuse. Stamens to 4.3 mm; filaments subulate, adnate at base to calyx tube. Staminodes subspatulate, 2–2.2 \times 0.8–1 mm, apex 3–5-dentate. Ovary half-superior, ovoid, ca. 2.5 mm; style to 1.5 mm, apex 3-lobed. Ripe capsules opening to expose seeds in an apparent splash cup.

Parnassia qinghaiensis is allied to *P. venusta* Jien but with bracts inserted at the base of the scape, sepal nerves confluent at the apex, staminode apices 3–5-dentate, petal base connate with the calyx tube, filament base connate with the calyx tube, and the ovary half-superior.

Habitat. Dense turf in alpine meadows. Elevation ca. 4200 m.

Paratype. CHINA. **Qinghai:** Darlag Xian, NW of Manzhang Pass, between Darlag and Baima, 33°17'51"N, 100°25'55"E, elev. 4230 m, 12 Aug. 1993, *T. N. Ho, B. Bartholomew & M. Gilbert* 1199 (CAS, HNWP).

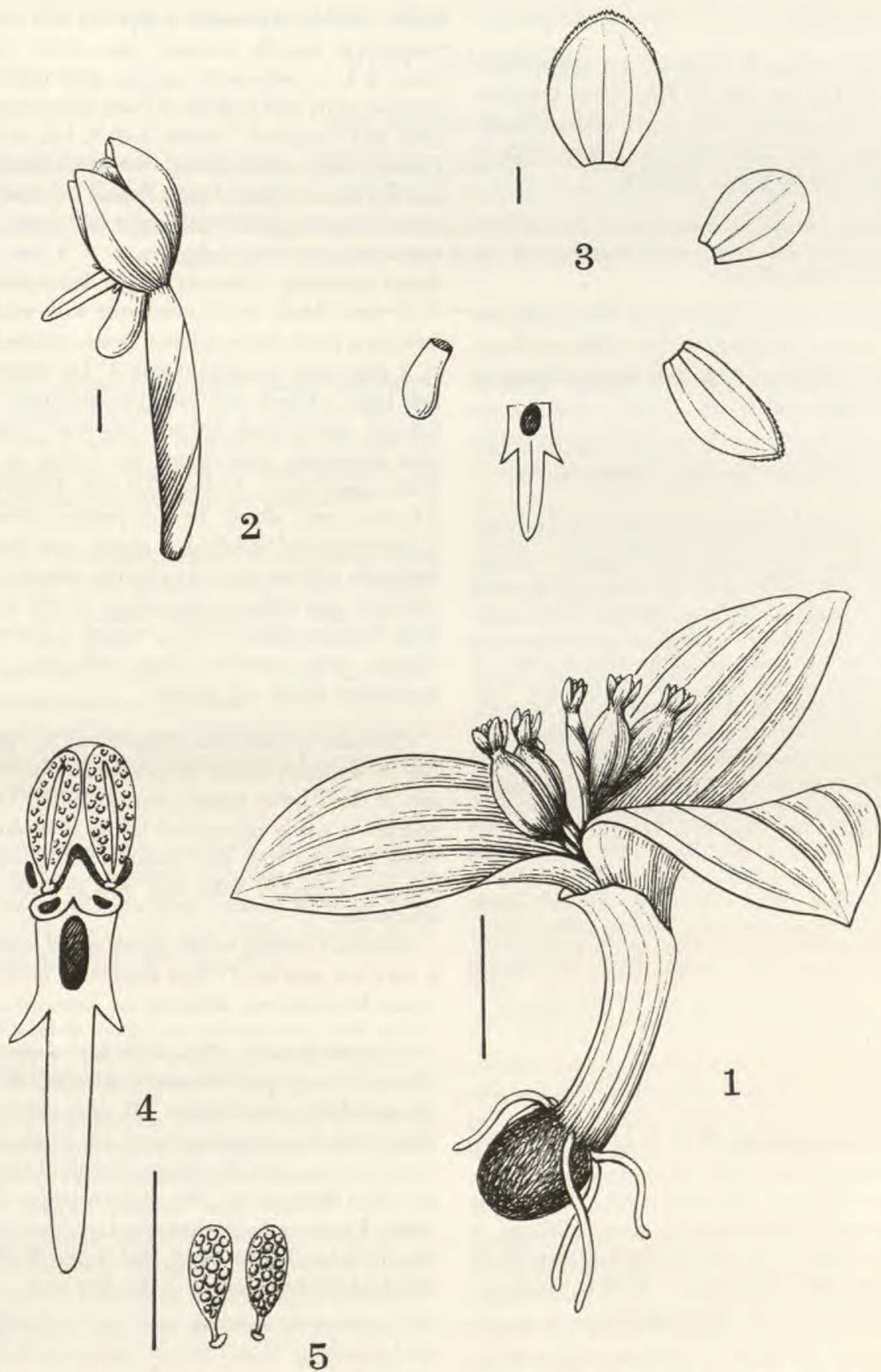


Figure 2. *Peristylus humidicolus* K. Y. Lang & D. S. Deng. —1. Plant. —2. Flower. —3. Clockwise from top: mid sepal, petal, lateral sepal, lip, and spur. —4. Column and lip. —5. Pollinaria. Scales: 1 = 1 cm, 2–5 = 1 mm. (Drawn by Wu Zhang-hua.)

SCROPHULARIACEAE

Pedicularis armata Maximowicz var. **trimaculata** X. F. Lu, var. nov. TYPE: China. Qinghai: Henan Monggolzu Zizhixian, Serlong Xiang, Xiazetan, elev. 3200–3310 m, 2 Sep. 1990, Y. H. Wu 7464 (holotype, HNWP).

A *Pedicularidi armata* var. *armata* labio infero corollae ut in galea maculis tribus marroninis linearibus vel anguste ellipticis ornato differt.

This variety is distinguished from *Pedicularis armata* var. *armata* by the lower lip of the corolla as in a galea, with three crimson or maroon, linear or narrowly elliptic spots.

Habitat. Alpine meadows in moist areas on sunny slopes and in turf. Elevation 3000–4000 m.

Paratypes. CHINA. **Gansu:** Xiahe Xian, Meiwu Xiang, elev. 3390 m, 18 Aug. 1980, Y. He s.n. (LZU); Tianzhu Zangzu Zizhixian, Jingqian He, elev. 3400 m, 14 July 1991, R. F. Huang 2521, T. N. Ho 2198 (both HNWP); Luqu Xian, Gahai, elev. 3850 m, 12 Aug. 1991, *Taohe Exped.* 621, 703 (both LZU). **Qinghai:** Jigzhi Xian, near W bank of the Jigzhi He, elev. 3520–3700 m, 1965, Z. D. Wei 6500264 (LZU); Jigzhi Xian, Niabaoshan, Xunmucuo Hu, elev. 4000 m, 13 July 1971, *Xizang Med. Exped.* 559 (HNWP); Huzhu Tuzu Zizhixian, Beishan Natural Forest Factory, elev. 3000 m, 14 July 1982, B. Z. Guo 25602 (HNWP); Ledu Xian, Yaocaotai forest, Donggou, elev. 3800 m, 22 July 1986, Y. H. Wu 3326 (HNWP); Huzhu Tuzu Zizhixian, Dabanshan, Langya He, elev. 3100 m, 31 Aug. 1988, J. T. Pan 70 (HNWP); Baima Xian, Makehe forest, Rizhao Shan, elev. 3400–3800 m, 9 July 1983, W. Y. Wang 26933, 26768 (both HNWP); Henan Monggolzu Zizhixian, elev. 3280–3310 m, 2 Sep. 1990, Y. H. Wu 7469 (HNWP); Darlag Xian, just N of Manzhang, along the Manzhang He, between Darlag and Baima, 33°17'51"N, 100°25'55"E, elev. 4000 m, 12 Aug. 1993, T. N. Ho, B. Bartholomew & M. Gilbert 1187 (BM, CAS, HNWP, MO).

ORCHIDACEAE

Peristylus humidicolus K. Y. Lang & D. S. Deng, sp. nov. TYPE: China. Qinghai: Maqên Xian, Dawu Xiang, Muchang, SE of Maqên, 34°20'03"N, 100°30'34"E, elev. 3980 m, 5 Aug. 1993, T. N. Ho, B. Bartholomew & M. Gilbert 807 (holotype, HNWP; isotypes, AMES, BM, CAS, MO). Figure 2.

Haec species inter *Peristylus* planta humiliore 4–4.5 cm alta, scapo brevissimo, floribus ebracteatis, sepalo intermedio ovato-rotundato, petalis obovato-rotundatis, labello trilobo, lobo intermedio ligulato-lineari, lobis lateralibus parvis, triangulatis, apice acuminatis bene distincta.

Herbs, terrestrial, perennial, erect, 4–4.5 cm tall. Tuber globose, 8–10 mm, fleshy. Stem stout, 0.8–1.5 cm. Leaves 3 or 4, crowded at top of stem, spreading; petiole 3–5 mm including sheath; leaf blade ovate-

elliptic to ovate-lanceolate, 2.5–3 × 1.2–2 mm, base rounded to broadly cuneate, apex acute. Inflorescence a 4- or 5-flowered raceme, later corymb-like because ovary and pedicel of lower flower are thickened and elongated. Pedicel 5–9 × 1–2 mm wide. Flowers yellow-green, small, without bracts, petals and lip thicker than sepals. Sepals 3-veined, apex white marginate and denticulate; mid sepal cymbiform-erect, ovate-orbicular, ca. 4 × 3 mm; lateral sepals spreading, obliquely elliptic-lanceolate, ca. 4 × 2 mm. Petals erect, connivent with mid sepal forming a hood above column, ovate-rounded, ca. 3 × 2 mm, apex rounded, veins 3. Lip porrect, 3.5 mm long, 3-lobed; mid lobe ligulate-linear, 2.5 × 0.8 mm, apex obtuse; lateral lobes small, triangular, apex acuminate; spur oblong, ca. 2 mm, ca. 1 mm diam., apex obtuse. Column 2.5 mm. Anthers erect, 2-locular, apex obtuse, locules parallel; staminodes 2, hemispherical at bilateral anther near base. Pollinaria 2; pollinia narrowly elliptic, granular, caudicle short and elliptic, disc naked viscid; rostellum large between anther locules. Stigmas 2, protuberate, elliptic, under rostellum. Ovary contorted, cylindrical to obovate, 6–10 × 2–6 mm.

Peristylus humidicolus is unique in the genus. It has no distinctly allied species and is distinct from any of the Tibetan species (Lang, 1987). This new species is easily recognized by its stout and short stem, pedicels that are elongate and ovaries that become contorted with age, and flowers without bracteoles.

Habitat. Growing on the sides of tall tussocks in a very wet area on a slight slope with slow-flowing water. Elevation ca. 4000 m.

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